

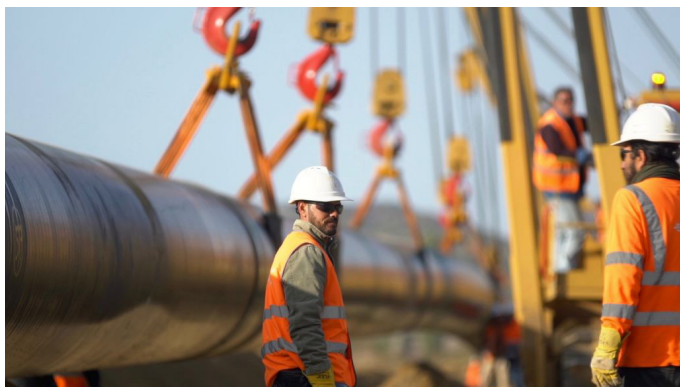
Trans Adriatic Express: A model for infrastructure investment



“As a dedicated operator of hyper scale digital infrastructure, EXA continuously invests to expand the depth and breadth of its network footprint.

Our mission is to provide high quality, reliable and scalable infrastructure between the locations our customers demand, which are typically the large datacentre clusters, cloud regions and cable landing stations (CLS).”

Steve Roberts, VP Strategic Investments



Strengthening infrastructure

Robust, reliable and secure infrastructure is the backbone to our modern society. Powering businesses and data to transform and connect people no matter where in the world, drives our investment plans and strategic growth. As digital infrastructure specialists we singularly focused on enabling connectivity for our customers and powering user experiences to drive

agility, engagement and rapid communication .

EXA Infrastructure (EXA) builds and maintains infrastructure for information and growth, powering economies to thrive in this digital age. Existing infrastructure provides a faster deployment time and route to market for our customers. However, where there is a lack of suitable existing infrastructure EXA will construct new terrestrial and subsea cables such as our recent investment projects in the South and North Balkans as well as our plans in Mazara del Vallo in Southern Italy.

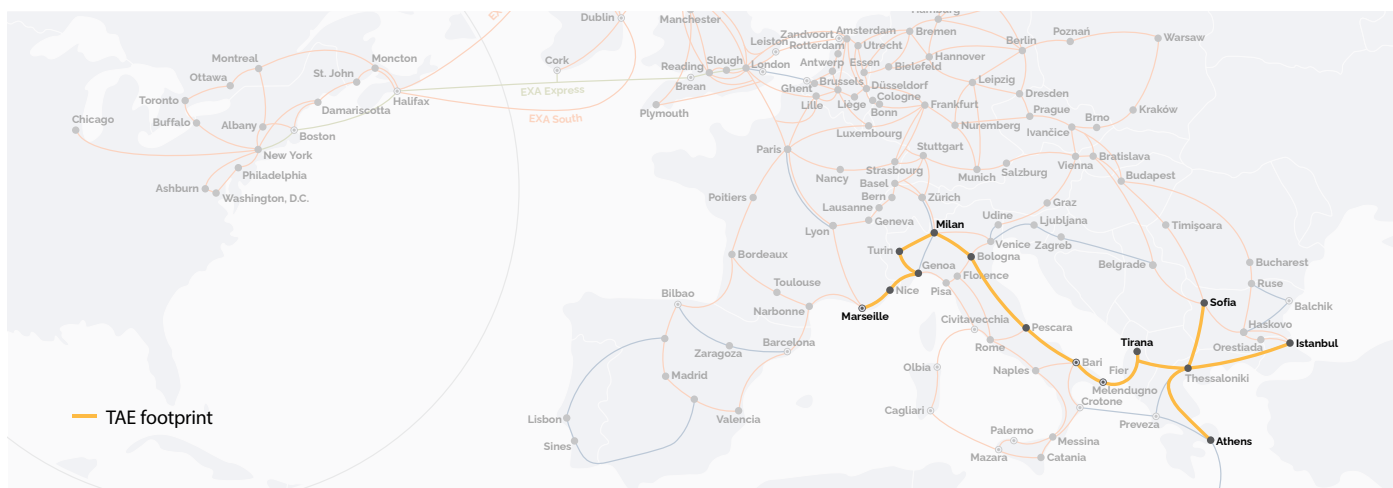
EXA makes growth inevitable and scale sustainable.

As an alternative to purpose built telecom infrastructure; motorways, railways, oil, gas and water pipelines sometimes have additional ducts installed for telemetry or signaling purposes. If there are spare ducts available, new fibre optic cables can be installed and used for commercial telecommunications purposes. The power of collaboration and partnerships is the catalyst for economical investments to strengthen and expand infrastructure. In fact, there are many examples from the original telecom networks that were built during the late 1990's of cross industry collaboration. In the last two decades there has been a lack of infrastructure investment which has stifled such long-haul telecom projects. In recent years, there has been a renewed investment focus on infrastructure projects linked to the growing user demand for streaming services and information accessible almost real time. As such, opening up new possibilities for telecom operators to deploy fibre optic cables alongside non-telecom assets.

EXA's extensive terrestrial and subsea fibre network underpins the connectivity required to power digital platforms. Operating Europe's largest infrastructure footprint, we are continually expanding and investing to ensure our customers have the critical connectivity they require.

Spotlight: TAE

The Trans Adriatic Express (TAE), is a joint venture formed between EXA and the Trans Adriatic Pipeline Ag (TAP), the owner of a critical new gas pipeline connecting the Caspian Sea to southern Italy. The project



was completed in 2020, which connected the pipeline between Melendugno in southern Italy, through Albania and Greece to the Turkish border at Kipoi. It connects to the Trans Anatolian Pipeline (TANAP) through Turkey to Azerbaijan.

Two state-of-the-art fibre optic cables have recently been installed adjacent to the gas pipeline for telemetry, monitoring and safety purposes, as well as a subsea fibre optic cable under the Adriatic Sea.

The scope of the EXA joint venture covers the extent of the TAP territory and creates a unique fibre optic network connecting Milan, Tirana, Athens, Sofia and Istanbul with high quality, high performance and ultra-reliable digital infrastructure.

“TAP has constructed a masterpiece of engineering which is vital to Europe’s energy independence, but its core business is the transportation of gas, not the provision and operation of telecom services.”

Steve Roberts, VP Strategic Investments

The relationship is symbiotic; EXA is a leading dedicated operator of digital infrastructure across Europe and the Atlantic, making it an ideal partner to TAP.



Expert leaders in infrastructure

Energy and transport infrastructure can often provide a unique and reliable physical route, it is often distant from the major data traffic hubs, requiring a telecom infrastructure operator to integrate it to unlock its full potential. EXA has brought its unique experience to the joint venture - constructing over 1300km of fibre optic interconnect between the gas pipeline and the major regional traffic hubs of Bari, Tirana, Athens, Sofia and Istanbul, where it integrates seamlessly with the EXA global network.

In addition to interconnecting TAP to local traffic hubs (data centres) EXA has used its expertise to install ILA shelters at the gas valve/compressor stations and has deployed an Infinera flex-grid optical transport layer delivering leading 400G and Spectrum services. EXA provides all engineering and support functions and manages operations from its global NOC in Dublin.

Reliability and Diversity

The creation of TAE allows EXA to provide its customers with highly reliable and differentiated routes and enables TAP to unlock additional value to its shareholders. The close cooperation between EXA and TAP means both parties contribute core assets and competences to meet the growing demand of traffic and has forged a solid partnership for growth.

EXA is proud to bring its focus, expertise and scale to undertake such demanding and capital intensive projects. Watch this space as EXA replicates this model with other infrastructure partners across our footprint.

Trans Adriatic Express: “a new highway corridor”

What is the Trans Adriatic Express (TAE)?

TAE is a seamless fibre backbone of more than 4,500 km of network perimeter between the Greek/Turkish border and Marseilles. It connects the major data centers of southeastern Europe.

Its backbone consists of four segments:

- Onshore TAP segment (Kipoi-Fier)
- Offshore TAP segment (Fier-Melendugno)
- Onshore Melendugno-Bari
- Onshore Bari-Marseille (via Milan)

The nearby capitals cities of Athens, Istanbul, Sofia and Tirana are also connected to the TAE backbone via fiber extensions that effectively connect these regional hubs to the hubs in western Europe.

State-of-the-art regional system

TAE is not only a new route but a regional system with a key advantage to lower CAPEX and OPEX costs, which is attributed to its state-of-the-art fibre optic cable (FOC) and route design.

TAE provides a high-quality route between southern Italy and Turkey using the latest quality G.652D fiber with an average installed loss of <0.19dB/m at 1550nm. At the same time, competing fiber in traversing countries is generally older and of lower quality.

TAE with its approximately 100km of submarine sec-

tion requires no special Super-RAMANs to setup and operate. Instead, it works just like any other terrestrial dark fiber span.

Fundamentally, a deployment of a typical DWDM system with today's standards would yield nothing less than 25Tbps/fp across the TAE route. And that is by utilising the DWDM Band-C only!

Embedded reliability

TAE will provide unprecedented levels of infrastructure security.

Traditionally, the FOC are laid somewhere between 60 and 120 cm below the ground. TAE follows a different approach. The TAE FOC owing to the fact that is attached to the TAP gas pipeline is buried at depths that vary from a minimum of 1m up to 10m below the ground surface. The TAP is classed as Critical National Infrastructure and it has regular patrols and inspections.

Furthermore, TAP has put together a very stringent framework that restricts the list of activities that can be performed in proximity to the pipeline. This means:

- Around the restricted ownership zone (4+4m on either side of the TAP pipeline), no digging activities are allowed but only superficial cultivation of plants
- Around the building restriction zone (20+20m on either side of the TAP pipeline), no construction of buildings of any nature is allowed



These two key rules offer a distinctive advantage to the TAE infrastructure – fibre cuts are expected to happen rarely. According to the latest report of EGIG, the average failure frequency trend is downward, and the modern gas pipeline infrastructure is now more safe than ever. According to the report: "The five year moving average failure frequency in 2019, which represents the average failure frequency over the past 5 years, equals 0.126 per year per 1,000 km."

As such, TAE will experience exceptionally high levels of reliability compared to the traditional cables that are installed in the public roads. A typical fibre cable deployment suffers one fibre cut per 1000km per year based on industry estimates. It does not seem unreasonable to suggest that the TAE/TAP infrastructure will experience reliability levels of up to eight times more than of a traditional telco deployment of a FOC.

Low-latency route: TAE to reach new benchmarks

TAE is more than just a network on which west and east meet. The gas pipeline is built in a very direct route offering a low-latency route between Italy and Turkey. As such, it's the shortest route which involves 39 directional drill river crossings and 3 micro tunnels through mountains. Istanbul and Milan have never been closer than they are now!

The ambition for is to have deep synergies with the subsea cable systems of the future. The ones that are due to branch out in Crete or Athens will seek for alternative routes to Milan, Sofia, and Istanbul. This is particularly important to connect to Milan, for its elevated role as a fully blown hub. This connection is expected to attract an ever-growing amount of traffic from South-east Europe.



Challenging the Status Quo

TAE is disrupting the regional cable systems across the six countries that it connects. Gone are the days when connecting Istanbul to Italy would necessitate fragmented infrastructure, multi-party agreements, subpar fiber quality and inconsistent SLA KPIs. The stitched-up network architecture of putting together fibre segments from different suppliers, with the arrival of TAE becomes a relic of the past.

TAE suggests a new route connecting East to West, a new highway corridor. TAE proposes a one-stop-shop of new infrastructure by unifying, uniformizing the fiber quality across the countries that traverses, the network performance, the consistency in service delivery and trust in customer support.

"We at EXA are experts in infrastructure, we are known for our streamlined approach to help our partners to connect their dots. EXA on the TAE domain will provide Capacity (Wavelength) and Spectrum services but also Dark Fiber subject to availability."

Antonios Kollaras, Network Investment Manager

TAE at a glance

4,500

km of network perimeter

>25

Tbps per fp

1,138

km total route from Bari to Kipoi

106

km Adriatic sub-sea crossing

12

ILA shelters Bari-Kipoi

1.0

minimum burial depth

04 23

RFS (starting from)

400G

waves ready from day 1

0.19

dB/km attenuation @1.550nm

72

optical fibres

39

directional drill river crossings

40

m wide protection strip



- The TAE perimeter of nearly 4,500 km is strategically valuable for EXA and covers
 - 6 countries
 - 2 new markets for EXA (Albania and Greece)
 - 7 major hubs/cities
- Lowest latency route between Italy and Istanbul
- Latest technology fibre and ILA shelters
- provides unique diversity from Istanbul to Europe

Service Availability

Wavelength	10G, 100G, 400G
Spectrum	Yes
Ethernet	Yes
Dark Fibre	G.652D
ILA Colocation	Yes

About TAE - Trans Adriatic Express

TAE is a joint venture (JV) between EXA Infrastructure and the Trans Adriatic Pipeline AG (TAP), designed to provide the most direct and reliable fibre optic infrastructure between Italy, Greece and Turkey.

The system will be operational from end of May 2023.

